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10/064,040	06/04/2002	Yen-Wu Hsieh		9770

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EXAMINER

CARRILLO, BIBI SHARIDAN

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 05/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/064,040

Applicant(s)

HSIEH ET AL.

Examiner

Sharidan Carrillo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 7 are indefinite because it is unclear what one of ordinary skill in the art would consider as a "naked" metal structure. Claims 1 and 7 are further indefinite because there is not positive recitation of etching the wafer. Claim 1 is further indefinite because it is unclear what is meant by the term "hot". Specifically, at what temperatures would one of ordinary skill in the art consider water to be "hot" since the term is relative. Claim 3 is further indefinite because it recites "bubbling the heated DI water with CO₂ for keeping the heated DI water in a weak basic state". However, in the specification, paragraph 11 teaches bubbling the heated DI water with CO₂ for keeping the heated DI water in a weak acidic state. Claims 5 and 11 are further indefinite because it is unclear what is meant by an amine-based basic solution. Does it mean that the solution has an amine or the solution has a composition which has the -N- group present.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 5-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsao et al. (6165279).

In reference to claims 1 and 6, refer to Fig. 1 which teaches dipping the wafer in an RCA-1 bath 114 (ammonium hydroxide/water/hydrogen peroxide), following by dipping in a hot quick dump rinse bath 116 to remove residue from the wafer surface. In reference to claim 5, Tsao et al. teach ammonium hydroxide solution which reads on an amine-based solution.

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-2 and 5-6 are rejected under 35 U.S.C. 102(e) as being anticipated by Chang et al. (6273099).

Chang teaches a method of cleaning a wafer comprising dipping the wafer in a first cleaning vessel having a basic solution (52) and then dipping the wafer in a second cleaning vessel to perform a hot quick dump rinse process (54)(col. 2, lines 40-45, col. 3, lines 35-47). In reference to claim 2, refer to col. 3, lines 48-60. In reference to claim 5, refer to Fig. 1. In reference to claim 6, refer to Fig. 2.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsao et al. (6165279) in view of applicant' admission of the prior art .

Tsao et al. teach the invention substantially as claimed with the exception of the

limitations recited in claims 2 and 3. In paragraph 5, applicant teaches that it is well known and conventional in the art to perform a quick dump rinse by bubbling DI water with CO₂ to keep the solution in a weak acidic state to neutralize the basic substances on the surface of the wafer and introducing the solution from the bottom of the cleaning vessel.

It would have been within the level of the skilled artisan to have modified the method of Tsao et al. to include the conventional step of performing a quick dump rinse by bubbling DI water with CO₂ and introducing the solution from the bottom of the cleaning vessel for purposes of providing a solution in a weak acidic state to neutralize the basic substances present on the wafer surface.

11. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (6273099) in view of applicant's admission of the prior art.

Chang et al. teach the invention substantially as claimed with the exception of the limitations recited in claim 3. In paragraph 5, applicant teaches that it is well known and conventional in the art to perform a quick dump rinse by bubbling DI water with CO₂ to keep the solution in a weak acidic state to neutralize the basic substances on the surface of the wafer and introducing the solution from the bottom of the cleaning vessel.

It would have been within the level of the skilled artisan to have modified the method of Chang et al. to include the conventional step of performing a quick dump rinse by bubbling DI water with CO₂ for purposes of providing a solution in a weak acidic state to neutralize the basic substances present on the wafer surface.

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12. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (6273099).

Chang et al. teach the invention substantially as claimed with the exception of the specific temperatures as recited in claim 4. In the abstract, Chang et al. teach rinsing with DI water heated to a temperature of at least 50°C. In col. 3, lines 65-67, Chang et al. further teaches that a higher water temperature may be used if desired for the effective removal of contaminants. It would have been with the level of the skilled artisan to increase the temperature of the DI water rinse, as taught by Chang et al. for purposes of effectively removing particles from the wafer surface.

13. Claims 1-2, and 4-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ma et al. (6652666) in view of Chang et al. (6273099).

In reference to claim 1, Ma et al. teach dipping the wafer into a first cleaning vessel containing a basic solution (34) and transferring the wafer to a second cleaning vessel (38) to perform a quick dump rinse (Fig. 2). In reference to claim 7, refer to Fig. 1 of Ma et al. In reference to claims 1, 7, and 14, Ma et al. teach a quick dump rinse and a final rinse (Fig. 1, element 22, Fig. 2, element 40), but fails to teach a hot quick dump rinse and a final rinse at room temperature. Ma et al. further fail to teach introducing the DI water from the bottom of the cleaning vessel as recited in claims 2 and 9.

Chang et al. teach performing a quick dump rinse at temperatures greater than 50°C, followed by a final rinse at room temperature (Fig. 1, 54, 56). The quick dump

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rinse and final rinse provides adequate removal of residues remaining on the wafer surface. In reference to claims 2 and 9, refer to Fig. 2 of Chang et al.

It would have been obvious to a person of ordinary skill in the art to have modified the quick dump rinse and final rinse of Ma et al., to include a quick dump rinse at temperatures greater than 50°C, followed by a final rinse at room temperature, as taught by Chang et al., for purposes of effectively removing residues present on the wafer surface and further enhancing cleaning efficiency by eliminating the need for additional etching solutions.

Further, it would have been obvious to a person of ordinary skill in the art have modified the method of Ma et al., to include introducing the DI water from the bottom of the cleaning vessel since Chang et al. teach that introducing the water from the bottom of the vessel in a quick dump rinsing process is well known in the art.

Ma et al. in view of Chang et al. teach the method substantially as claimed with the exception of the limitations of claims 4 and 10. In the abstract, Chang et al. teach rinsing with DI water heated to a temperature of at least 50°C. In col. 3, lines 65-67, Chang et al. further teaches that a higher water temperature may be used if desired for the effective removal of contaminants. It would have been with the level of the skilled artisan to increase the temperature of the DI water rinse, as taught by Chang et al. for purposes of effectively removing particles from the wafer surface.

In reference to claims 5 and 11, refer to col. 1, lines 55-60 of Ma et al. In reference to claims 6, 8, and 13, refer to Figs. 1-2 of Ma et al., which illustrates no scrubber present. In reference to claim 12, refer to col. 2, lines 40-41 of Ma et al.

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14. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ma et al. (6652666) in view of Chang et al. (6273099) as applied to claims 1-2 and 4-14 as described in paragraph 13 above, and further in view of applicant's admission of the prior art.

Ma et al. in view of Chang et al. teach the invention substantially as claimed with the exception of the limitations recited in claim 3. In paragraph 5, applicant teaches that it is well known and conventional in the art to perform a quick dump rinse by bubbling DI water with CO₂ to keep the solution in a weak acidic state to neutralize the basic substances on the surface of the wafer and introducing the solution from the bottom of the cleaning vessel.

It would have been within the level of the skilled artisan to have modified the modified method of Ma et al. to include the conventional step of performing a quick dump rinse by bubbling DI water with CO₂ for purposes of providing a solution in a weak acidic state to neutralize the basic substances present on the wafer surface.

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ying et al. teach RCA-1 followed by a hot QDR. Tso et al. teach a hot QDR at temperatures greater than 65°C. Lee and Wang et al. teach amine, NMP, and QDR baths. Biebl et al. teach hot/cold QDR. Chiu et al. teach NMP followed by water rinse.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharidan Carrillo whose telephone number is 571-272-1297. The examiner can normally be reached on Monday-Friday, 6:00a.m-2:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sharidan Carrillo
Primary Examiner
Art Unit 1746

bsc



SHARIDAN CARRILLO
PRIMARY EXAMINER